Helpful overview of alkene nucleophilic reactivity (with regioselectivity and diastereoselectivity info)
Addition vs. Elimination

-**Addition**
  - H - NUC
  - \[ \text{H} - \text{Nuc} \]

-**Elimination**
  - H\text{Nuc}
  - + base
  - Nuc = LG \_ Leaving group

**Mechanism**

- H\text{base} \_ LG
- H\text{base} \_ LG

- trisub. (Zaitsev) more stable
- disub. (Hofmann) less stable

- sterically hindered base
Leaving Groups (LG)

- **NaOMe**
  - **X**: Cl, Br, I
  - **X̂**
  - **stable**
  - **H-OMe**

- **OH**
  - **base**
  - **X**
  - **will not happen**
  - **OH**
  - **NOT a good LG**
  - **H-OMe**

- **Ts-Cl**
  - **Py**
  - making O a better LG
  - **more stable**

- **NaOMe**
  - **elim can now happen**
  - **H-OMe**
47) Suggest an efficient synthesis for the following transformation:

1. Label carbons w/ func groups (arrows, non C-H bonds)

2. Identified # of steps

3) $H_X$
   - $ROOR$
   - $BH_3\cdot THF$
   - $H_2O_2, NaOH$

4) $KOTBu$
   - $OH$
   - $X$

5) $TSCI, py$

6) $KOTBu$
50) Suggest an efficient synthesis for each of the following transformations:

(a)  

(b)  

(c)  

(d)  

\[ \text{OH} \quad \rightarrow \quad \text{OH} \quad \text{OH} \]

(a) 

1) TsCl, py  
2) NaOEt  
3) H_3O^+ (Mark)  

After reaction:

1) TsCl, py  
2) NaOEt  
3) BH_3 · THF  
4) H_2O_2, NaOH
b) 
\[ \text{Br} \quad \text{A} \quad \text{B} \quad \text{Br} \]

1) NaOMe (Zaitsev)  
2) HBr, ROOR

\[ \text{elim then add} \]

\[ \text{Br} \quad \text{A} \quad \text{B} \]

1) NaOMe (Zaitsev)
2) HBr

c) 
\[ \text{Cl} \quad \text{A} \quad \text{B} \quad \text{H} \quad \text{H} \]

1) NaOMe (Zaitsev)
2) H₂, Pt(acac) (syn)

\[ \text{elim add} \]

\[ \text{A} \quad \text{B} \quad \text{H} \quad \text{meso} \]

d) 
\[ \text{OH} \quad \text{A} \quad \text{B} \quad \text{OH} \]

\[ \text{elim then add} \]

\[ \text{meso} \]

\[ \text{syn!} \]

\[ \text{KmnO₄, NaOH} \]

\[ \text{O₅O₄, NMO} \]

\[ \text{no selectivity possible (Zaitsev vs. Hofmann)} \]
54) Suggest suitable reagents to perform the following transformation:

\[
\text{Racemic} \quad \xrightarrow{\text{Markovnikov}} \quad \text{Product}
\]

\[
\text{Oxymercuration} \quad (\text{Hg} (\text{OAc})_2, \text{H}_3\text{O}^+) \quad \text{demercuration} \quad (\text{NaBH}_4)
\]

\[
\text{Wrong product!}
\]

*rearrangement
55) Propose a mechanism for the following transformation:

Like the mercurium intermediate in oxymercuration (same regioselectivity)
59) Compound X is treated with Br₂ to yield *meso*-2,3-dibromobutane. What is the structure of compound X?
The following reaction is observed to be regioselective. Draw a mechanism for the reaction and explain the source of regioselectivity in this case:

3° carbocation that is resonance stabilized ($\text{\textcircled{\dagger}}$) is more stable than a 3° carbocation that is not stabilized by resonance ($\text{\textcircled{\dagger\dagger}}$)
67) In much the same way that they react with H₂, alkenes also react with D₂ (deuterium is an isotope of hydrogen). Use this information to predict the product(s) of the following reaction:

\[
\begin{align*}
\text{Cyclohexene} & \xrightarrow{\text{D₂ / Pt}} \text{?} \\
\text{syn hydrogenation conditions} & \text{except replace H with D}
\end{align*}
\]

\[
\begin{align*}
\text{D-D} & \xrightarrow{\text{Pt}} \text{product} \\
+ \text{evan}
\end{align*}
\]
The accepted mechanism for the following transformation involves a carbocation rearrangement. Rather than occurring via a methyl shift or a hydride shift, a carbon atom of the ring migrates, thereby converting a secondary carbocation into a more stable, tertiary carbocation. Using this information, draw a mechanism for the following transformation: